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EXAMINER	
KISS, ERIC B	
ART UNIT	**PAPER NUMBER**
2192	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/034,854	SHADMON ET AL.	
	Examiner	Art Unit	
	Eric B. Kiss	2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The reply filed 15 August 2005 has been received and entered. Claims 1-33 are pending.

Response to Amendment

2. Applicant's amendment to the specification appropriately addresses the objection detailed in the previous Office action. Accordingly, this objection is withdrawn in view of Applicant's amendments.

3. Applicant's amendment to claim 10 appropriately addresses the objection to claim 10, as detailed in the previous Office action. Accordingly, this objection is withdrawn in view of Applicant's amendment.

Response to Arguments

4. Applicant's arguments filed 16 August 2005 have been fully considered but they are not persuasive.

The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In this case, the teachings of *Hughes* are relied upon to show the need for minimum overhead tracing/profiling in the field of disk drive controllers. The teachings of Roediger et al.

are relied upon as showing one means of providing such a minimum overhead tracing/profiling mechanism, which the particular advantages of enabling/disabling the collection of profile data without having to halt execution (col. 3, lines 16-28).

Hughes describes the general state of the art in disk drive controllers (without any reference to a particular model). If the teachings of *Hughes* are taken literally (as Applicant does on p. 16 of the remarks submitted 16 August 2005), then it is implied that no disk drive controller can tolerate any overhead in the profiling procedure, because even the slightest reduction in speed would lead to catastrophic failure. However, this literal interpretation imposes a problem when Applicant's invention is analyzed in light of such an interpretation. Applicant does not purport to have invented a no-overhead profiling system (see, for example, p. 16, line 19, through p. 17, line 3, of Applicant's specification, along with Figs. 25-28), and under the literal interpretation of *Hughes* advanced by Applicant, the instant invention, which fails to meet the zero-overhead requirement, would appear inoperable (thus, failing to meet the requirements of 35 U.S.C. §§ 101, 112). A more reasonable interpretation seems to be that disk drives controllers can tolerate some minimal overhead, and striving to reduce profiler overhead as much as possible would be a reasonable design motivation.

The rejections under 35 U.S.C. § 103(a) are maintained and reproduced below.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 2, 4, 11, 18-27, 29, 31, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,960,198 to Roediger et al. in view of Paul Hughes, "Lifting the Lid," Summer 2001 (hereinafter *Hughes*).

As per claim 1, *Roediger et al.* discloses: identifying computer executable program code that includes a set of computer executable program instructions for recording analytical data for at least a subset of the computer executable program code (see, for example, col. 5, line 63, through col. 6, line 32), the set of computer executable program instructions being disabled from executing (see, for example, col. 5, line 63, through col. 6, line 32); and without halting execution of the computer executable program code, enabling execution of the set of computer executable program instructions (see, for example, col. 6, lines 18-20).

Roediger et al. fails to expressly disclose the prescribed steps being carried out in a disk drive controller having a processor executing computer software stored in a memory communicating with the processor via a local bus.

However, *Hughes* teaches the need to selectively trace code within a disk drive controller without significantly slowing or stopping the system (see, for example, "Full speed ahead" on pp. 1-2).

Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to perform the method of *Roediger et al.* within such a disk drive controller environment. One would be motivated to do so to apply a known runtime-controllable

trace/profile system to eliminate bugs while avoiding potentially disastrous consequences associated with slowing or stopping such a known controller system.

As per claim 2, *Roediger et al.* further discloses identifying an instruction in the computer executable program code that disables the set of computer executable program instructions from executing (see, for example, col. 6, lines 18-32); and causing a change to the computer executable program code to counter the effect of the instruction (see, for example, col. 6, lines 18-32). Therefore, for reasons stated above, such a claim also would have been obvious.

As per claim 4, *Roediger et al.* further discloses the computer executable code being arranged to cause execution of the computer executable program code to bypass the set of computer executable program instructions (see, for example, col. 6, lines 18-32). Therefore, for reasons stated above, such a claim also would have been obvious.

As per claim 11, *Roediger et al.* further discloses receiving a request to enable execution of the set of computer executable program instructions (see, for example, col. 6, lines 61-66). Therefore, for reasons stated above, such a claim also would have been obvious.

As per claim 18, *Roediger et al.* discloses identifying analytical software for recording analytical data of software execution and identifying software source code that does not include the analytical software (see, for example, col. 5, line 63, through col. 6, line 32); deriving computer executable program code from the software source code and the analytical software,

the computer executable program code including computer executable instructions for recording analytical data for at least a subset of the computer executable program code, the computer executable instructions being inactive and being capable of being activated during execution of the computer executable program code (see, for example see, for example, col. 5, line 63, through col. 6, line 32).

Roediger et al. fails to expressly disclose the prescribed steps being carried out in a disk drive controller having a processor executing computer software stored in a memory communicating with the processor via a local bus.

However, *Hughes* teaches the need to selectively trace code within a disk drive controller without significantly slowing or stopping the system (see, for example, "Full speed ahead" on pp. 1-2).

Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to perform the method of *Roediger et al.* within such a disk drive controller environment. One would be motivated to do so to apply a known runtime-controllable trace/profile system to eliminate bugs while avoiding potentially disastrous consequences associated with slowing or stopping such a known controller system.

As per claim 19, *Roediger et al.* further discloses the computer executable program code being arranged to cause execution of the computer executable program code to bypass the computer executable instructions for recording analytical data for at least a subset of the computer executable program code (see, for example, see, for example, col. 6, lines 18-32). Therefore, for reasons stated above, such a claim also would have been obvious.

As per claim 20, this is an apparatus version of the claimed method discussed above (claim 1), wherein *Roediger et al.* discloses such an apparatus (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 21, this is an apparatus version of the claimed method discussed above (claim 18), wherein *Roediger et al.* discloses such an apparatus (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 22, this is a system version of the claimed method discussed above (claim 1), wherein *Roediger et al.* discloses such a system (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 23, this is a system version of the claimed method discussed above (claim 18), wherein *Roediger et al.* discloses such a system (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 24, this is a computer software version of the claimed method discussed above (claim 1), wherein *Roediger et al.* discloses such software (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 25, this is a computer software version of the claimed method discussed above (claim 18), wherein *Roediger et al.* discloses such software (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claims 26, *Roediger et al.* discloses identifying computer executable program code that includes at least one computer executable program instruction causing execution of analytical program instructions to be avoided, the analytical program instructions causing recording of analytical data for at least a subset of the computer executable program code (see, for example see, for example, col. 5, line 63, through col. 6, line 32); and without halting execution of the computer executable program code, performing a change directed to the at least one computer executable program instruction to allow execution of the analytical program instructions (see, for example see, for example, col. 5, line 63, through col. 6, line 32).

Roediger et al. fails to expressly disclose the prescribed steps being carried out in a disk drive controller having a processor executing computer software stored in a memory communicating with the processor via a local bus.

However, *Hughes* teaches the need to selectively trace code within a disk drive controller without significantly slowing or stopping the system (see, for example, "Full speed ahead" on pp. 1-2).

Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to perform the method of *Roediger et al.* within such a disk drive controller environment. One would be motivated to do so to apply a known runtime-controllable trace/profile system to eliminate bugs while avoiding potentially disastrous consequences associated with slowing or stopping such a known controller system.

As per claim 27, *Roediger et al.* further discloses performing the change in response to user input (see, for example, col. 6, lines 61-66). Therefore, for reasons stated above, such a claim also would have been obvious.

As per claim 29, *Roediger et al.* further discloses the at least one computer executable program instruction including a branch instruction (see, for example, col. 7, lines 33-64). Therefore, for reasons stated above, such a claim also would have been obvious.

As per claim 31, this is an apparatus version of the claimed method discussed above (claim 26), wherein *Roediger et al.* discloses such an apparatus (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 32, this is a system version of the claimed method discussed above (claim 26), wherein *Roediger et al.* discloses such a system (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

As per claim 33, this is a computer software version of the claimed method discussed above (claim 26), wherein *Roediger et al.* discloses such software (see, for example, Fig. 1), and all limitations have been addressed as set forth above. For reasons stated above, such a claim also would have been obvious.

7. Claims 3 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Roediger et al.* in view of *Hughes*, as applied above to claims 1 and 26, and further in view of U.S. Patent No. 6,006,033 to Heisch.

As per claim 3, in addition to the disclosure and teachings applied above to claim 2, *Roediger et al.* fails to expressly disclose removing the instruction from the computer executable program code. However, *Heisch* teaches removing an instruction and replacing it with instrumentation code (see, for example, col. 11, line 64, through col. 12, line 41). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to further modify the method of *Roediger et al.* to include such an instruction removal. One would be motivate to do so to facilitate instrumentation through a known patching means.

As per claim 30, in addition to the disclosure and teachings applied above to claim 26, *Roediger et al.* fails to expressly disclose removing the at least one computer executable program instruction and inserting at least one new program instruction that specifies a call to the analytical program instructions. However, *Heisch* teaches removing an instruction and replacing it with instrumentation code (see, for example, col. 11, line 64, through col. 12, line 41). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to further modify the method of *Roediger et al.* to include such an instruction removal. One would be motivate to do so to facilitate instrumentation through a known patching means.

8. Claims 5, 6, 8-10, 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Roediger et al.* in view of *Hughes*, as applied above to claim 1, and further in view of U.S. Patent No. 6,754,890 to Berry et al.

As per claim 5, in addition to the disclosure and teachings applied above, *Roediger et al.* fails to expressly disclose identifying a second set of computer executable program instructions wherein the second set of computer executable instructions is for recording analytical data for a second set of the computer executable program code, the second set including all or a portion of the computer executable program code, the second set of computer executable program instructions being disabled from executing; and causing execution of one of the sets of computer

executable program instructions to be enabled concurrently with execution of the other of the sets of computer executable program instructions being disabled. However, as discussed above, *Roediger et al.* does disclose such features relating to a first set of computer executable program instructions, including enabling/disabling functionality (see the disclosure applied above to claim 1). Further, *Roediger et al.* suggests that, in addition to using a single bit to control whether instrumentation code is enabled, several bits may be used to provide more than two levels of control over profile information generation (see col. 7, lines 30-32). Additionally, *Berry et al.* teaches the collection of analytical data for multiple portions of program code (see, for example, col. 15, lines 53-67). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to further modify the method of *Roediger et al.* to include such a second set of computer executable program instructions as per the suggestion set forth in *Roediger et al.* and the teachings of *Berry et al.* One would be motivated to do so to further isolate the sources of gathered profile data.

As per claim 6, additional to the teachings applied above to claim 5, *Berry et al.* further teaches one of the sets of computer executable program instructions recording analytical data for a parent function of a child function for which the other of the sets of computer executable program instructions records analytical data (see, for example, col. 15, lines 53-67). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to further modify the method of *Roediger et al.* to include such parent/child analytical data. One would be motivated to do so to further isolate the sources of gathered profile data.

As per claims 8 and 9, although *Roediger et al.* is silent on specific types of information collected through the disclosed profiling, *Berry et al.* teaches the recording of analytical data indicating a start time and an end time for an instance of execution of the at least a subset of the computer executable program code (see, for example, col. 15, lines 53-67). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to modify the method of *Roediger et al.* to include the recording of such time information. One would be motivated to do so to efficiently organize gathered profile information.

As per claim 10, although *Roediger et al.* is silent on specific types of information collected through the disclosed profiling, *Berry et al.* teaches calculating derivative analytical data during execution of the at least a subset of the computer executable program code (see, for example, col. 15, lines 53-67). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to modify the method of *Roediger et al.* to include such caluclation. One would be motivated to do so to efficiently organize gathered profile information.

As per claims 12-17, although *Roediger et al.* is silent on specific types of information collected through the disclosed profiling, *Berry et al.* teaches the interaction between a profiling system and a data structure comprising: an entry time field (see, for example, col. 15, lines 53-67), a return address field (see, for example, col. 16, lines 5-12), a re-entry time field (see, for example, col. 15, lines 53-67), a self time field (see, for example, col. 15, lines 53-67), a number of calls field (see, for example, col. 16, lines 5-12), and a function address field (see, for

example, col. 16, lines 5-12). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to modify the method of *Roediger et al.* to include interaction with such data structures. One would be motivated to do so to efficiently organize gathered profile information.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Roediger et al.* in view of *Hughes*, as applied above to claim 1, and further in view of U.S. Patent No. 5,784,554 to Hsiung.

As per claim 7, in addition to the disclosure and teachings applied above to claim 1, *Roediger et al.* fails to expressly disclose accepting an address range for the at least a subset of the computer executable program code. However, *Hsiung* teaches, as prior art, such an address range specifying the area of a program for which profile data is to be collected (see, for example, col. 1, lines 12-30). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to further modify the method of *Roediger et al.* to include such an address range. One would be motivated to do so to gather sampling profile data on the execution of portions of a program occupying ranges of addresses.

10. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Roediger et al.* in view of *Hughes*, as applied above to claim 26, and further in view of U.S. Patent No. 6,374,369 to O'Donnell.

As per claim 28, in addition to the disclosure and teachings applied above to claim 26, *Roediger et al.* fails to expressly disclose the at least one computer executable program instruction being included in a function header of the computer executable program code. However, *O'Donnell* teaches the use of functions (and their corresponding function headers) for use in instrumenting code (see, for example, col. 15, lines 40-59). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to further modify the method of *Roediger et al.* to include such function headers to implement instrumentation. One would be motivated to do so to promote code reuse and ease in implementing such instrumentation.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric B. Kiss whose telephone number is (571) 272-3699. The Examiner can normally be reached on Tue. - Fri., 7:00 am - 4:30 pm. The Examiner can also be reached on alternate Mondays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Tuan Dam, can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature should be directed to the TC 2100 Group receptionist: 571-272-2100.

EBK /EBK
October 28, 2005

TUAN DAM
SUPERVISORY PATENT EXAMINER